Insight Medical Publishing

Nanoscience & Nanotechnology Research

2020

Vol.4 No.2

Atomistic Processes of GaN Metal Organic Vapor Phase Epitaxy (MOVPE)

Kenji Shiraishi

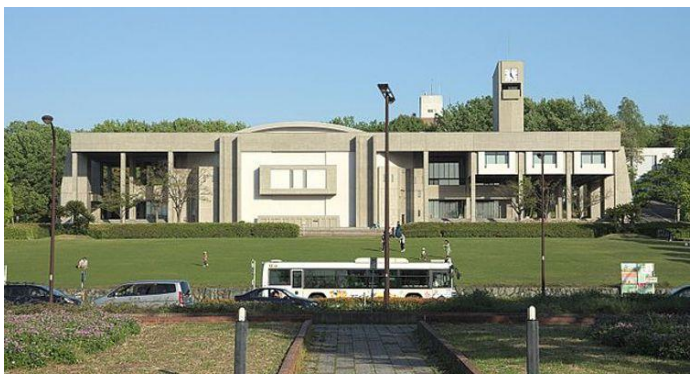
Institute of Materials and Systems for Sustainability (Nagoya University, Japan)

Abstract:

GaN has attract a great attention because it is the key material of future power devices as well as present optoelectronics devices. To achieve recent requirement of future power devices, epitaxial growth of high quality GaN is necessary, and atomistic understanding of GaN MOVPE growth is inevitable. In this presentation, we clarify the gas phase reactions of GaN MOVPE by using the first principles calculations. Our calculations indicate that TMG (trimethylgallium, $Ga(CH_3)_3$) decomposes into GaH_3 by removing methyl groups. This decomposition reaction includes two gas phase reactions of TMG + NH_3 → $DMGNH_2$ + CH_4 and $DMGNH_2$ + H_2 → DMGH + NH_3. This two step decomposition of TMG is the key atomistic mechanism of gas phase reactions of GaN MOVPE.

Biography:

Dr. Kenji Shiraishi has completed his PhD from the University of Tokyo, Japan in 1988 and worked for NTT basic research laboratories, Japan from 1988 to 2000. From 2001-2013, he worked for University of Tsukuba. From 2013, he moved to Nagoya University. He is now a professor of Nagoya university. He has published more than 200 papers in reputed journals.



Speaker Publications:

1. Theoretical possibility of stage corrugation in Si and Ge analogs of graphite; K Takeda, K Shiraishi; Physical Review B 50 (20), 14916
2. Visible photoluminescence from oxidized Si nanometer-sized spheres: Exciton confinement on a spherical shell; Y Kanemitsu, T Ogawa, K Shiraishi, K Takeda; Physical Review B 48 (7), 4883
3. A new slab model approach for electronic structure calculation of polar semiconductor surface; K Shiraishi; Journal of the Physical Society of Japan 59 (10), 3455-3458
4. First-Principles Study of Oxide Growth on Si(100) Surfaces and at /Si(100) Interfaces; H Kageshima, K Shiraishi; Physical review letters 81 (26), 5936
5. Intrinsic origin of visible light emission from silicon quantum wires: Electronic structure and geometrically restricted exciton; T Ohno, K Shiraishi, T Ogawa; Physical review letters 69 (16), 2400

Annual Congress on Smart Materials ; May 11-12, 2020; Amsterdam, Netherlands

Abstract Citation: Kenji Shiraishi, *Atomistic Processes of GaN Metal Organic Vapor Phase Epitaxy (MOVPE)*, Smart Materials 2020, Annual Congress on Smart Materials ; May 11-12, 2020; Amsterdam, Netherlands